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EXAMINER	
HESSELTINE, RYAN J	
ART UNIT	**PAPER NUMBER**
2623	16

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/621,768	Applicant(s) BARBOUR, BLAIR A.	
	Examiner Ryan J Hesseltine	Art Unit 2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 1, 2004 has been entered.

Response to Arguments

2. Applicant's arguments on page 11, filed June 1, 2004, have been fully considered but they are not persuasive. On page 11, third paragraph, applicant states, "the independent claims are amended to include the concept that the plurality of spatial phase characteristics includes at least one non-polarization spatial phase characteristic. This is in distinction from the inventor's previous work [USPN 5,890,095 to Barbour et al.] which focused only upon the use of polarization." In a telephone interview on May 25, 2004 (interview summary paper number 13), applicant stated that the added limitation (non-polarization spatial phase characteristic) is supported at least by the general discussion of spatial phase characteristics on pages 13-23, the Xth element in Figure 12, and bins 5 and 6 in Figure 15. The examiner respectfully disagrees. The examiner has not found any instance of the phrase "non-polarization spatial phase characteristic" in pages 13-23 or anywhere else in the specification or drawings. Throughout the specification, applicant refers to the claimed spatial phase characteristics as polarization characteristics (page 16, line 4-21; page 19, line 22-page 20, line 22; page 22, line 22-24; page 24, line 10-page 28, line 9; etc.). On page 32, third paragraph, of the specification, is a general

discussion of Figure 12 wherein isolation components 264-272 (including the Xth element 272) operate to provide certain spatial phase characteristics 274-282, but there is no mention that any one of these spatial phase characteristics is a non-polarization spatial phase characteristic. The only examples of spatial phase characteristics given in the specification are polarization characteristics. On page 37, second paragraph, is a general discussion of Figure 15 illustrating spatial phase characteristics that are separated by identifiers referred to as bins. The bins including polarization characteristics, angle, and material type. First of all, it is unclear to the examiner how material type can be a spatial phase characteristic. Secondly, the examiner believes this is the only mention of angle in the specification and it is also unclear how this is defined as a spatial phase characteristic.

3. On page 21, first paragraph, of the specification, it is stated that the spatial phase characteristic metric values provided via the detector arrays 18A-18X may include polarization characteristics (e.g., orientation and degree), and that the generated spatial phase characteristic metric values may represent shape, material, index of refraction, slope, three-dimensionality, polarization computation, phase geometry, object geometry, or molecular composition. If this is what is meant by "non-polarization" spatial phase characteristics, the examiner believes that Barbour et al. (USPN 5,890,095) discloses at least some of these characteristics (column 1, line 26-33; column 3, line 11-22; column 9, line 42-65).

4. Applicant's arguments with respect to claim 18 have been considered but are moot in view of the new ground(s) of rejection.

Specification

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the received electromagnetic energy having a plurality of spatial phase characteristics, including at least one non-polarization spatial phase characteristic.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1, 14, 17, 19 and 28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 14, 17, 19 and 28 contain the limitation "the received electromagnetic energy having a plurality of spatial phase characteristics, including at least one non-polarization spatial phase characteristic" in some form or another. The examiner has not found evidence of support for this limitation in the specification or drawings (see also above arguments).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

9. Claims 1-5, 7-14, 16, and 19-28 are rejected under 35 U.S.C. 102(a) as being anticipated by Barbour et al. (USPN 5,890,095, cited on applicant's IDS), hereafter Barbour.

10. Regarding claims 1 and 19, Barbour discloses an apparatus and method for information extraction from electromagnetic energy via multi-characteristic spatial geometry processing (column 1, line 6-11), said apparatus/method comprising: means (collection means 52) for receiving electromagnetic energy from a source, the received electromagnetic energy having a plurality of spatial phase characteristics (column 7, line 41-49), including at least one non-polarization spatial phase characteristic (column 1, line 26-33; column 3, line 11-22; column 9, line 42-65); means for separating (filtering) the plurality of spatial phase characteristics (polarizations) of the received electromagnetic energy (column 3, line 62 to column 4, line 22, line 39-50); means for identifying spatially segregated portions (pixels) of each spatial phase characteristic, with each spatially segregated portion (pixel) of each spatial phase characteristic (polarization vector) corresponding to a spatially segregated portion (pixel) of each of the other spatial phase characteristics (polarization vectors) in a group (super pixel; column 5, line 41-62; column 7, line 59-67); and means for quantifying each segregated portion (pixel) to provide a spatial phase metric (pixel value) of each segregated portion (pixel) for providing a data map (image) of the spatial phase metric (pixel value) of each separated spatial phase characteristic (polarization vector; column 7, line 41-67; column 8, line 35-45).

11. Regarding claims 2 and 22, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object as the source (column 5, line 28-40), and includes means for determining an imaging value associated with each group of corresponding segregated portions

(pixels) using the spatial phase metrics (column 5, line 41-49), and means for assembling an image of the object using the determined imaging values (column 7, line 53-67).

12. Regarding claims 3, 16, and 23, Barbour discloses that the spatial phase characteristics of the electromagnetic energy include polarization characteristics of the electromagnetic energy (column 1, line 6-11; column 5, line 41-49).

13. Regarding claims 4 and 24, Barbour discloses that said means for providing a data map includes providing the map to indicate spatial phase change (column 5, line 50-67).

14. Regarding claims 5 and 25, Barbour discloses that said means for quantifying each segregated portion (pixel) to provide a spatial phase metric (polarization) includes associating an information value (polarization vector, pixel value) with each segregated portion (column 7, line 59-67).

15. Regarding claim 7, Barbour discloses that said apparatus is a single view imaging apparatus (standard video camera) for providing an image of an object as the source, and includes means for determining an imaging value associated with each group of corresponding segregated portions using the spatial phase metrics (see above discussion of claim 2), and means for assembling a three dimensional image representation of the object using the determined imaging values (column 9, line 56-65).

16. Regarding claim 8, Barbour discloses that said means for assembling a three-dimensional image representation includes means for using determined values representative of slope functions (angle of incidence, 3-D shape, object orientation) of the object (column 9, line 56-65).

17. Regarding claim 9, Barbour discloses that said means for assembling a three dimensional image representation includes means for using determined values representative of surface (3-D) shapes of the object (column 9, line 56-65).

18. Regarding claim 10, Barbour discloses that said means for assembling a three-dimensional image representation includes means for using determined values representative of surface contour (angle of incidence, 3-D shape, orientation) of the object (column 9, line 56-65).

19. Regarding claim 11, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object as the source, and includes means for determining an imaging value associated with each group of corresponding segregated portions using the spatial phase metrics (see above discussion of claims 2 and 7) and indicative of material composition of the object associated with each group of corresponding segregated portions, and means for assembling an image representation of the object indicative of material composition using the determined imaging values (column 9, line 56-65).

20. Regarding claim 12, Barbour discloses that said apparatus is an imaging apparatus for providing an image of an object obscured by an electromagnetic energy scattering media (detection through a dispersible medium) that permits a minimal amount of electromagnetic energy passage (radiation is scattered) and includes means for determining imaging values (column 7, line 59-67) from the minimal amount (reduce scattered radiation, thus increasing the detection range) of electromagnetic energy (column 9, line 37-41, line 66-column 10, line 12).

21. Regarding claims 13 and 26, Barbour discloses that said apparatus is a communication apparatus (column 9, line 5-7, 17-21) and said means for quantifying each segregated portion to

provide a spatial phase metric includes determining an information value from each segregated portion (column 7, line 59-67).

22. Regarding claim 20, Barbour discloses processing the spatial phase metrics (polarization vectors) to derive information (column 8, line 15-42).

23. Regarding claim 21, Barbour discloses that said step of separating includes discerning a three-dimensional shape aspect of the ellipsoidal shape of the electromagnetic energy (column 9, line 56-65).

24. Regarding claim 27, Barbour discloses processing all spatial phase metrics to derive information (column 4, line 23-26; column 7, line 41-45).

25. Regarding claims 14 and 28, Barbour discloses an imaging apparatus and method of creating an image comprising: means 52 for receiving electromagnetic energy proceeding from an object, the received electromagnetic energy having a plurality of spatial phase characteristics, including at least one non-polarization spatial phase characteristic (column 1, line 26-33; column 3, line 11-22; column 9, line 42-65); and means for creating an image of the object utilizing the spatial phase characteristics, including at least one non-polarization spatial phase characteristic, of the received electromagnetic energy (column 6, line 24-43; column 7, line 41-67).

Claim Rejections - 35 USC § 103

26. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

27. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour as applied to claim 1 above.

28. Regarding claim 17, Barbour discloses an imaging apparatus comprising: means 52 for receiving electromagnetic energy proceeding from an object, the electromagnetic energy having a plurality of spatial phase characteristics including at least one non-polarization spatial phase characteristic (column 1, line 26-33; column 3, line 11-22; column 9, line 42-65); and means for creating an image of the object utilizing the spatial phase characteristics, including the at least one non-polarization spatial phase characteristic, of the received electromagnetic energy (column 6, line 24-43; column 7, line 41-67). Barbour does not explicitly disclose that the electromagnetic energy conveys insufficient characterization in the visible and infrared spectrums to permit viable intensity-based and/or frequency-based image creation, but it is disclosed that the spatial phase sensor provides for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced. Therefore, if there were an insufficient characterization in the visible and infrared spectra, the spatial phase sensor of Barbour would be capable of measuring/enhancing radiation in other parts of the electromagnetic spectrum. It would have been obvious to one of ordinary skill in the art at the time the invention was made to receive electromagnetic energy which conveys insufficient characterization in the visible and infrared spectrum as taught by Barbour in order to provide for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced (column 7, line 41-45).

29. Regarding claim 6, Barbour does not explicitly disclose that the electromagnetic energy conveys insufficient characterization in the visible and infrared spectrums to permit viable intensity-based and/or frequency-based image creation, but it is disclosed that the spatial phase

sensor provides for electromagnetic radiation signals across the electromagnetic spectrum to be enhanced (see above discussion of claim 17).

30. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour as applied to claim 14 above, and further in view of Oshige et al. (USPN 5,311,285, cited on applicant's IDS), hereafter Oshige.

31. Regarding claim 15, Barbour does not disclose whether or not said means for receiving and said means for creating include components that move relative to each other. Oshige discloses a measuring method for ellipsometric parameters wherein the beam, which is elliptically polarized and reflected by the sample surface, is divided into four different polarized components by stationary optical elements and no moving members are required. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize means for receiving and means for creating including components that do not move relative to each other as taught by Oshige in order to reduce the size and weight of the unit as a whole allowing installation in a narrow place, which increases the applicability of the device (column 9, line 49-64).

32. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour in view of Barter et al. (USPN 6,122,404, previously cited), hereafter Barter.

33. Regarding claim 18, Barbour discloses an imaging apparatus comprising: means 52 for receiving electromagnetic energy from an object (column 7, line 46-58), the received electromagnetic energy having a plurality of polarization characteristics (column 5, line 41-49); means for separating (filtering) the plurality of polarization characteristics of the received electromagnetic energy (column 3, line 62 to column 4, line 22, line 39-50); means for creating a

plurality of images (super pixels), each image (super pixel) having a plurality of pixels in a matrix, with each pixel of each image (super pixel) being at a matrix location (column 5, line 41-62; column 7, line 59-67); means for quantifying a polarization metric value (vector) at each pixel of each created image; means for determining an imaging value associated with each group of pixels using the quantified values; and means for assembling an image using the determined imaging values (column 7, line 41-67; column 8, line 35-45).

34. Barbour discloses forming a plurality of pixels in predetermined patterns (super pixels) with each pixel having a different polarization characteristic vector, but does not disclose that each image is created using one of the separated polarization characteristics and each pixel corresponding to a pixel at the same matrix location of each of the other images, the corresponding matrix location pixels being in a group. Barter discloses a visible Stokes polarimetric imager which will measure the four Stokes parameter state-of-polarization over a two-dimensional image (matrix) acquired in real time (column 6, line 40-46) using four separate polarimetric filters 86 and imaging devices 88 that are positioned relative to a prism assembly 50 to separately receive each of four beams 62-68 emitted from the prism (Figure 5; column 7, line 21-46, line 66-column 8, line 14). Barter also discloses that the imaging devices need to be aligned so that the lens assembly focuses the image on the devices to ensure that the same element in the field of view maps to the same pixel of each of the imaging devices (column 8, line 10-14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to create each image using one of the separated polarization characteristics wherein each pixel belongs to a group of pixels each at the same matrix location of each of the other images as taught by Barter in order to measure a two-dimensionally resolved, real-time

complete polarimetric description of a visible scene by separately and contemporaneously measuring each separate polarization parameter of visible light reflected from a scene (column 5, line 45-column 6, line 9).

Conclusion

35. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USPN 5,337,081 to Kamiya et al. discloses a triple view imaging apparatus including an optical system that separates the original light ray into a plurality of secondary light rays having different polarization and non-polarization (wavelength band) optical properties.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ryan J. Hesseltine
July 22, 2004

JINGGE WU
PRIMARY EXAMINER